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APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
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09/992,803

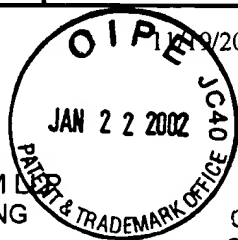
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DEC 17 2001

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CONFIRMATION NO. 7350

## FORMALITIES LETTER



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Date Mailed: 12/11/2001

## NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

### Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

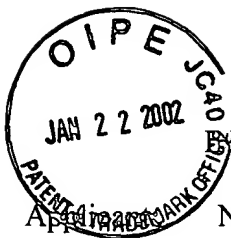
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PART 2 - COPY TO BE RETURNED WITH RESPONSE



THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Nicolas Pierre Georges CERTAIN

Group Art Unit: 3627

Serial No.: 09/992,803.

Filed: November 19, 2001

For: **DEVICE FOR DAMPED ELASTIC CONNECTION AND METHOD OF  
MANUFACTURING IT**

**COVER LETTER FOR DOCUMENTS IN RESPONSE TO NOTICE TO FILE  
MISSING PARTS OF APPLICATION - FILING DATE GRANTED  
UNDER 37 C.F.R. 1.54(d)**

**BOX MISSING PARTS**  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Dear Sir:

This is in response to the Notice to File Missing Parts of Application-Filing Date Granted (Notice), a copy of which is being returned with this Response, that is due by February 11, 2002.

In response to the Notice, enclosed herewith, duly executed by the applicant, is:

i) a duly executed Declaration and Power of Attorney (Declaration) document;

the Declaration which identifies the specification for the above-captioned application to which it is directed by the inventors' names, filing date, title, but not serial number, for filing in the above-captioned application, and wherein the Declaration further identifies the inventors by their residence and citizenship and is otherwise in compliance with 37 C.F.R. 1.63.

Please confirm the receipt of this Cover Letter and the Declaration being submitted herewith is in compliance with the requirements of 37 C.F.R. 1.51(a)(2), 153(d), and 1.63 for a Declaration.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to : Commissioner of Patents and Trademarks, Washington, D.C. 20231, on 12-27-01

[Signature]

If the Office has any questions, or wishes to discuss this matter, please call the attorney of record identified in this application as the one to whom all communications are to be directed, or the undersigned at the telephone number indicated below.

Respectfully submitted,

Nicolas Pierre Georges CERTAIN

Dec. 27, 2001  
Date

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# PRV



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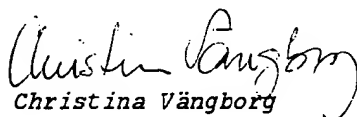
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Patent application number

(86) Ingivningsdatum              2000-12-08  
Date of filing

Stockholm, 2001-12-14

För Patent- och registreringsverket  
For the Patent- and Registration Office

  
Christina Vängborg

Avgift  
Fee            170:-

**PATENT- OCH  
REGISTRERINGSVERKET**  
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2000 -12- 0 8

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TITLE

ANTENNA ARRANGEMENT

## 5 TECHNICAL FIELD OF THE INVENTION

The present invention relates to an antenna arrangement comprising a radiator, a ground structure, feed connector and ground connector.

## 10 BACKGROUND OF THE INVENTION

The size of the communication devices, such as radio transceivers, mobile telephones, Bluetooth equipped devices, etc., is reduced every day as a result of the reduced size of the electrical components. Moreover, the transmission rate of these devices has increased.

15

One critical point in a radio device is the antenna, especially the size of the radiator. The antenna must be small, have high transmission rate and small.

IFAs (Inverted F-Antennas) 10 are known, as shown in Fig. 1, which comprise a radiator 11 of  $\lambda/4$  type arranged in parallel with a ground plane 12 on a carrier, such as a printed circuit board. The radiator 11 is fed via a connector 13 and the radiator is connected to the ground via connector 14. The antenna has a minimum voltage at or close to the ground connection.

25

The IFA is usually broadband antenna, and not suitable for small band applications. Moreover, the radiator is small in size, and e.g. in GHz applications, the antenna is mechanically instable, which means that the position of the radiator relative the ground plane can be displaced, which affects the antenna characteristics.

30

Also, ILA (Inverted L-Antenna) and patch antennas are known in which the radiator size and the distance between the radiator and ground plane is significant.

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**SUMMARY OF THE INVENTION**

Thus, the main object of the present invention is to provide an arrangement of ground  
5 dependent type, which has a distinct distance between the radiator and the ground plane and has  
a minimum voltage at one end section of the radiator.

Other advantages of the antenna arrangement are the excellent electrical and RF characteristics  
and mechanical stability.

10

Therefore, in the initially described antenna arrangement the radiator comprises at least a first  
and a second end and that said radiator is connected to said ground structure at said first and  
second ends by means of said ground connectors.

**15 BRIEF DESCRIPTION OF THE DRAWINGS**

In the following, the invention will be further described in a non-limiting way with reference to  
the accompanying drawings in which:

- 20 Fig. 1 schematically illustrates an IFA according to prior art,  
Fig. 2 schematically illustrates an antenna according to the present invention,  
Fig. 3 is a schematic perspective view of a second embodiment of the antenna according to  
the invention, and

Figs. 4a-4d are schematic views of further embodiments according to the invention.

25

**DETAILED DESCRIPTION OF THE EMBODIMENTS**

According to one preferred embodiment of the invention as shown in Fig. 2, the antenna 20  
comprises an oblong radiator 21, feed connector 23, ground connections 24a and 24b and a  
30 ground structure 22. The radiator 21 has a first and a second end and it is connected to the

ground structure 22 by means of connectors 24a and 24b at said first and second end. Thus, a stable construction is achieved. The feed connector 23 is arranged so that a suitable impedance is achieved, e.g. 50  $\Omega$ . In this case the feed connector is arranged close to the ground connector 24b. The feed connector in this case extends through the ground structure via a hole and it is isolated from the ground. However, it can be arranged to contact the radiator from above or a side.

Thus, the antenna obtained according to the invention is a  $\lambda/2$  antenna which normally has better characteristics than a  $\lambda/4$  antenna, which can be a result of the amount of currents on the radiator.

The antenna element can consist of a wire or the like. It may also consist of a strip arranged on a carrier. As shown in Fig. 3, the antenna 30 may also consist of plate-shaped radiator 31 arranged above a ground plane 32. In this embodiment the ground connectors 34a and 34b have different dimensions. The radiator is fed via connector 33. This antenna corresponds to a Planar Inverted E-Antenna (PIEA).

The antenna according to the invention has different electrical properties than the prior art antennas described above. The diagram of Fig. 3 illustrates the with respect to the radiator's 21 extension. The minimum voltage is obtained at one grounded end where the feeding is arranged. The cross over from of the current direction is situated approximately at the middle section of the radiator.

The antenna may also comprise a non-conductive carrier on which the parts of the antenna are plated and which can be snapped above a ground plane.

Other embodiments of the antenna according to the invention are illustrated in Figs 4a- 4c. In Fig. 4a, the ground connectors are arranged in a distance from the ends of the radiator. In Fig. 4b, which is a perspective view, the radiator is substantially L-shaped. In Fig. 4c, the radiator is substantially T-shaped having a ground connection at the third end. In Fig. 4d, the radiator is

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substantially U-shaped.

The invention is not limited the shown embodiments but can be varied in a number of ways without departing from the scope of the appended claims and the arrangement and the method  
s can be implemented in various ways depending on application, functional units, needs and requirements etc.

P16184.AF1, BA, 04/12/00



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CLAIMS

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1. Antenna arrangement (20, 30) comprising a radiator (21, 31), a ground structure (22, 32), a feed connector (23, 33) and ground connectors (24a, 24b; 34a, 34b),  
5 characterised in  
that said radiator comprises at least a first and a second end and that said radiator is  
connected to said ground structure at said first and second ends by means of said ground  
connectors (24a, 24b; 34a, 34b).
- 10 2. The antenna arrangement of claim 1,  
characterised in  
that said radiator is arranged substantially parallel to said ground structure.
3. The antenna arrangement of claim 1 or 2,  
15 characterised in  
that said feed connector is arranged between said ends such that a suitable impedance is  
achieved.
4. The antenna arrangement according to any of claims 1 - 3,  
20 characterised in  
that said radiator (21) consists of a wire.
5. The antenna arrangement according to any of claims 1 - 3,  
characterised in  
25 that said radiator (31) is plate shaped.
6. The antenna arrangement according to any of claims 1 - 3,  
characterised in  
that said radiator is a strip arranged on a carrier.
- 30

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7. The antenna arrangement according to any of claims 1 - 3,  
characterised in  
that said radiator, feed connector and ground connectors are arranged as a plated layer on a  
shaped non-conductive carrier.

5

8. The antenna arrangement according to any of preceding claims,  
characterised in  
that said radiator is substantially L-shaped.

- 10 9. The antenna arrangement according to any of preceding claims,  
characterised in  
that said radiator is substantially U-shaped.

- 15 10. The antenna arrangement according to any of preceding claims,  
characterised in  
that said radiator is substantially T-shaped.

11. The antenna arrangement of claim 10,  
characterised in  
20 that said a ground connector is arranged at each end of said substantially T-shaped radiator.

12. The antenna arrangement according to any of preceding claims,  
characterised in  
that said ground connectors are arranged in a distance from said first and second ends.

25

13. The antenna arrangement according to any of preceding claims,  
characterised in  
that said antenna arrangement is a  $\lambda/2$  antenna.

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14. The antenna arrangement according to any one of claims 2-13,  
characterised in  
that said impedance is  $50\Omega$ .

- 5 15. A method of providing a  $\lambda/2$  antenna arrangement (20, 30) comprising a radiator (21, 31), a  
ground structure (22, 32), a feed connector (23, 33) and ground connectors (24a, 24b; 34a,  
34b), said radiator comprises at least a first and a second end,  
characterised by  
connecting radiator said ground structure at said first and second ends by means of said  
10 ground connectors (24a, 24b; 34a, 34b) and arranging said feed connector in a distance from  
one of said ground connectors such that a suitable impedance is obtained.

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## ABSTRACT

The present invention relates to an antenna arrangement (20, 30) comprising a radiator (21, 31), a ground structure (22, 32), a feed connector (23, 33) and ground connectors (24a, 24b; 34a, 34b). Said radiator comprises a first and a second end and that said radiator is connected to said ground structure at said first and second ends by means of said ground connectors (24a, 24b; 34a, 34b).

(Fig. 2)

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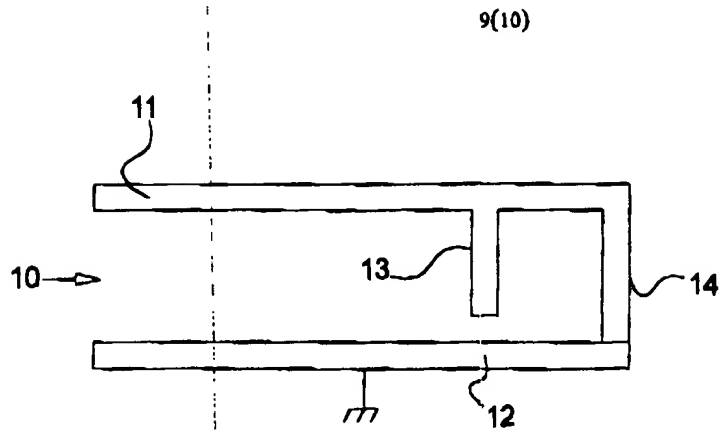


Fig. 1

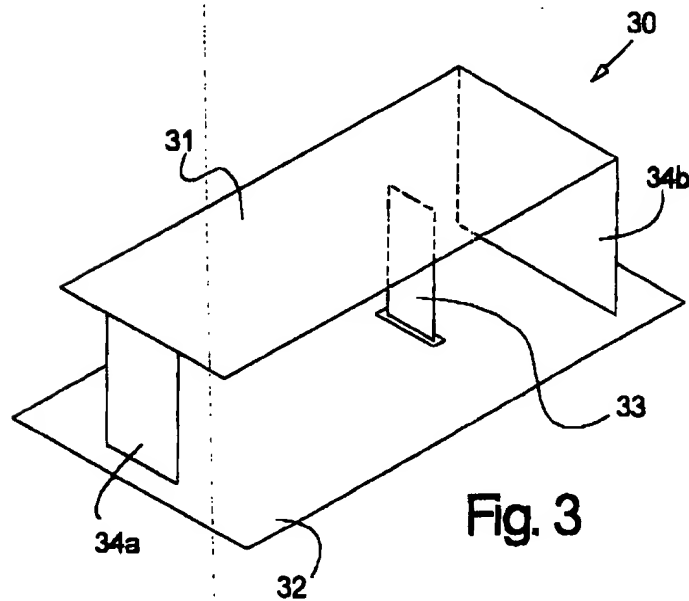


Fig. 3

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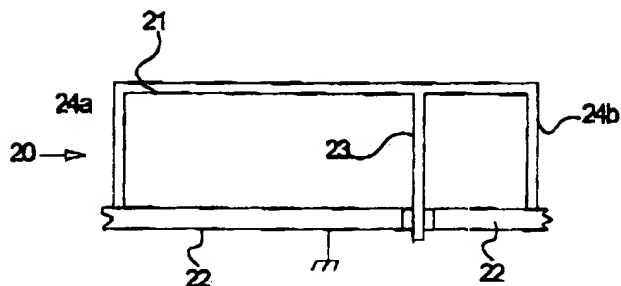


Fig. 2



Fig. 4a



Fig. 4b

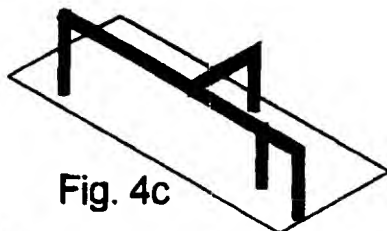


Fig. 4c

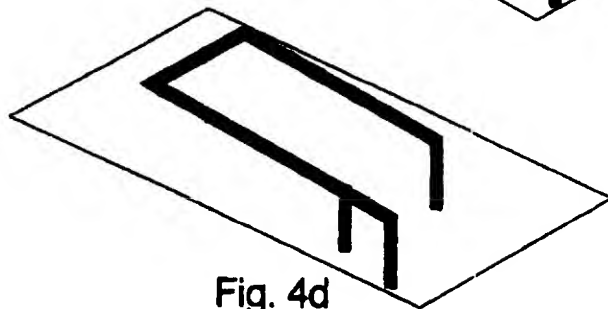


Fig. 4d